Simpson®

April 9, 2014

Mr. Stuart Clark
Program Manager
Air Quality Program
Washington State Department of Ecology
P.O. Box 47600
Olympia, WA 98504

Re: Response to EPA March 3, 2014 Letter

Dear Mr. Clark:

This letter responds to EPA's March 3, 2014 letter to you regarding EPA's review of the proposed revision of the Power Boiler 7 (PB7) NOx BACT limit in PSD permit PSD-06-02. EPA's letter explains EPA's view that the proposed revision is not warranted based on the information EPA reviewed. Simpson Tacoma Kraft (STK) respectfully disagrees with EPA's assertions for the reasons discussed below. This letter addresses each of the three criteria EPA cites for determining whether a BACT limit can be revised and shows why each one is met.

The "Ogden Memo" Criteria

EPA's letter explains that the Agency considers three criteria when determining whether a BACT limit can be revised, all of which must be met. The criteria are drawn from a November 19, 1987 EPA memorandum titled, *Request for Determination on Best Available Control Technology (BACT) Issues – Ogden Martin Tulsa Municipal Waste Incineration Facility.* The letter describes the criteria as follows:

1. Whether the source was constructed in conformity with the permit (see 40 CFR 52.21(r)(1);
2. Whether the permitted BACT levels are inappropriate as a result of errors, faulty data, or incorrect assumptions contained in the permit application; and
3. Whether the source investigated all available options to reduce emissions and demonstrated that compliance cannot be achieved.

In its letter, EPA states that it did not find any errors, faulty data, or incorrect assumptions with the original BACT determination and therefore concludes that the 2007 BACT limit and annual NOx limit were not inappropriate under the second criterion. Regarding the first criterion, EPA states that it "has likely not been met." And for the third, EPA states that STK has not provided sufficient

information to make a determination. Each criterion and the reasons it is met in this case is discussed below.

Criterion 1: The source was constructed in conformity with the permit

EPA states that it "has reason to believe" that STK did not construct the cogeneration steam turbine generator project in conformity with the 2006 application and 2007 PSD Permit, referencing a February 12, 2014 letter from EPA to STK. In that letter, EPA identifies three activities that it believes were undertaken without PSD authorization: adding economizer modules, upgrading the fuel feed system, and burning more urban wood. EPA also suggests that the measured increases in NO_X emissions result, at least in part, from the latter two changes. STK believes that EPA reached these conclusions without a complete review of the facts.

STK has provided a response to EPA's February 12, 2014 letter, with copy to Ecology. The section titled "Area of Discussion #1" explains in detail why EPA's claims regarding these three activities are fully consistent with the PSD application and Permit. In summary, the application presented a scope of changes associated with upgrading steaming conditions to 875 psig and 825°F and to increasing the maximum steaming rate of PB7 to 340,000 lb/hr. The changes were purposefully broadly described in the permit application because of uncertainty before any project of this type, but the aspects salient to permit development and regulatory compliance were clearly defined.

Following that approach, the Permit broadly authorizes STK to make "[b]oiler improvements to produce the higher pressure and temperature steam required for power generation" and "[u]pgrades to #7 Power Boiler to increase its Maximum Continuous Rated (MCR) steaming capacity from 300,000 lb/hr to 340,000 lb/hr." In both cases, the Permit follows these descriptions with lists of changes that the improvements and upgrades "will include," meaning the lists don't limit the authorized improvements and upgrades to only the specified changes.

STK's response to EPA shows that the economizer and fuel feed system improvements were in fact upgrades that were approved by the Permit (the list of changes the upgrades "will include" even contains the phrase, "wood fuel feed system improvements"). Regarding the claim that burning more urban wood is somehow inconsistent with the Permit, the fuel profile provided in the application projected utilization of urban wood. And because STK has historically burned urban wood and made no physical change to specifically enable additional utilization of urban wood, there is no basis to assert that burning more represents a boiler modification or departure from the assumptions relied on for permitting.

STK can find no evidence that the cogeneration project was not constructed in conformity with the Permit. The boiler modification was consistent with the physical and operational assumptions of the BACT conclusions that Ecology made during

permit development (to wit, overfire air installation and combustion factor management). And there have been no relevant changes to the boiler since 2009 other than what was authorized by the Permit. The emissions calculations presented in the application, and approved by Ecology, were based on 340,000 lb/hr steaming rate and a fuel consumption rate that is conservative with respect to subsequent actual rates.

Criterion 2: The permitted BACT levels are inappropriate as a result of errors, faulty data, or incorrect assumptions contained in the permit application

EPA states that, contrary to the conclusions of Ecology's draft permit amendment, it did not find any errors, faulty data, or incorrect assumptions in the 2006 PSD Permit Application and that the 2007 NOx BACT limit and the annual NOx emission limit were not inappropriate for the cogeneration project. STK believes that there were multiple incorrect assumptions inadvertently relied on in the 2006 PSD Permit Application, and as such, relaxation of the NOx limits is appropriate.

STK submitted the 2006 PSD Permit Application before installing and operating the overfire air (OFA) system, and the permit was issued before STK had enough operating experience to determine its effect on emissions. As a result, several assumptions were made by the design engineers in order to predict future emissions from PB7 following the project. And some of these assumptions have turned out to be clearly incorrect.

Jansen Combustion and Boiler Technologies, Inc. designed and installed the new OFA system at PB7. In the two years before this installation, the average NO_X emission rate observed was 0.18 lb/MMBtu. This emission rate occurred at a time when combustion in the boiler was inefficient resulting in higher CO emissions and lower NOx emissions. During this time, firing rates of the boiler were relatively low. While the 0.18 lb/MMBtu emission rate was historically low relative to typical performance of PB7, it was already close to the initially permitted rate of 0.20 lb/MMBtu.

One goal of the OFA project was to reduce fossil fuel firing and increase hog fuel firing in PB7. Jansen expected this reduction of oil firing and increase of hog fuel firing to reduce NOx emissions. Jansen predicted, but would not guarantee, that the OFA would result in a 20% NOx emission reduction while also complying with the CO limit. Jansen's NOx performance prediction fully considered the changes to PB7 for the cogeneration project, and was therefore used as the basis for the proposed BACT limit. However, at startup after project construction STK found Jansen's assumption to be incorrect and this level of NOx control to be unachievable with the OFA technology. The NOx performance associated with the Jansen OFA system was an incorrect assumption.

The fact that the permitted BACT level was erroneous is reflected in the fact that NOx BACT emission limits for many similar boilers are higher than 0.20 lb/MMBtu and typically around 0.30 lb/MMBtu. The 0.20 lb/MMBtu limit in the 2007 PSD permit is at the low end of values typically achieved for a wood and oil co-fired boiler that relies on combustion control for NO_x suppression. Examples from the RACT/BACT/LAEAR Clearinghouse (RBLC) for permit dates between January 1991 and April 2014 are presented in the table below. In retrospect, the 0.20 lb/MMBtu level initially permitted for STK PB7 was unrealistic considering the performance of similar units.

RBLC ID	Facility/Location	Unit	Control Method	NOx Emission Limit
AL-0250	Boise White Paper Jackson, AL	Combination Boiler	Low NOx burners	0.30 lb/MMBtu (3-hr average)
WA-0337	Boise Cascade Corporation Wallula, WA	Hog Fuel Boiler	OFA system, ESP	0.30 lb/MMBtu (30-day rolling average)
LA-0188	Temple-Inland (dba International Paper Bogalusa Mill) Bogalusa, LA	No. 12 Hogged Fuel Boiler	OFA, low NOx burners, good combustion practices	0.45 lb/MMBtu (averaging period not specified)
AL-0116	Gulf States Paper Corporation Tuscaloosa, AL	Power Boiler	Low NOx burners	0.30 lb/MMBtu (averaging period not specified)
OK-0038	Weyerhaeuser Valliant, OK	Bark Boiler	OFA system	0.30 lb/MMBtu (averaging period not specified)

STK has diligently pursued optimization of PB7 combustion conditions, specifically to get NOx and CO as low as possible. These efforts have *not* resulted in NOx emissions consistently below 0.28 lbs/mmBtu. STK commissioned reviews by qualified combustion engineers. These reviews concluded that it is not technically feasible to obtain NOx emissions below 0.2 lbs/mmBtu at PB7 through combustion factor design or management (Sonnichsen Engineering Memo 2014). Failure to achieve NOx emissions below 0.2 lbs/mmBtu despite these intensive efforts further demonstrates that the BACT specification was erroneous.

Given the evidence provided in EPA's RBLC for similar units, the advice given by combustion engineers following detailed review, and STKs own experience trying to reduce NOx emissions on PB7, it is inescapable fact that the 0.20 lbs/mmBtu limit was erroneously specified due to faulty data and incorrect assumptions. Accordingly, the original BACT limit is inappropriate and revision is warranted.

Criterion 3: The source investigated all available options to reduce emissions and demonstrated that compliance cannot be achieved

EPA says that STK has not provided sufficient information, "specifically information on the quantities of salt-laden fuel currently being burned" in PB7, for EPA to determine whether this third criterion has been met. Before discussing whether STK has met this criterion, it's worth looking more closely at EPA's Ogden Memo discussion of it, rather than just EPA's single sentence summary. The Memo suggests that the requirement is actually to investigate options to *reasonably achieve* the permit limit and barring that, to lower emissions as possible.

> At a minimum the source should be required to investigate and report to the permitting agency all available options to reduce emissions to a lower (if not the permitted) level. If compliance with the permit can be reasonably achieved, the source should be required to take steps to reduce emissions. If sufficient emission reductions down to the permitted level cannot be reasonably achieved, then a reevaluation of the permit may be warranted.

It's not clear what EPA believes is necessary to meet this criterion, although we know that it considers the quantities of salt-laden fuel currently being burned in PB7 to be relevant. We read this criterion to require reasonable efforts to lower emissions to or towards the limit, without having to investigate installation of entirely new controls. We believe this is a reasonable interpretation, as it does not seem right to make a BACT limit revision hinge on investigating controls that the present BACT determined to be beyond BACT. But the fact is that STK has done both.

The mill has gone to great lengths to bring NOx emissions down. As described above, STK has been able to bring NOx emissions down to below 0.28 lbs/mmBtu (typically around 0.25 lbs/mmBtu) through optimization of PB7 combustion conditions. STK addressed fuel feed system and grate issues that caused uneven distribution of fuel on the grate. STK has experimented with air control to the point where both NOx and CO emissions have been effectively minimized. Any further reductions, even though physical changes to the air system, would not get NOx emissions much below current levels.

STK has also thoroughly investigated the feasibility of controlling NOx with add-on controls. EPA's interest in salt-laden fuel information suggests that perhaps the Agency is interested in the utilization of add-on NOx controls that involve ammonia injection (SNCR or SCR) and concerns regarding formation of ammonium chloride opacity and fine particulate (PM2.5). Detailed discussions of this concern were provided in the 2006 PSD application and in the 2010 PSD amendment application. The chloride loading to the boiler is relevant to the feasibility of NOx control through ammonia injection.

On December 20, 2012, EPA asked Ecology for a detailed accounting of sources, quantities, types, and characteristics (e.g., chloride content) of fuels and materials burned in PB7 from 2004-2005 (the period forming the basis for the PSD permit limits) and after PSD permit issuance in 2007. EPA asked for more than a general description; seeking delineation of suppliers, composition, quantities, and combination of different materials. STK provided a detailed response to EPA through Ecology, which included general descriptions, sources, specific and relative quantities, types, characteristics of all fuels burned in PB7, and laboratory analysis reports, which included the chlorine content of the fuel. The information provided showed that the biomass component of the fuel is made up of purchased hog fuels (including urban wood), recycled paper fiber residuals (OCC rejects), dewater biosolids (sludge), and wood fines. Accordingly, detailed information regarding the fuels burned and chloride content was provided to EPA. STK offered to provide additional information if necessary, but we are not aware of any further inquiry from EPA.

STK believes that the only "fuel basket" that is economically viable for the facility presents unusually high chloride loading to PB7. STK has performed very extensive fuel trials to try to achieve Boiler MACT compliance through fuel management (for the hydrogen chloride limit). The last trial in February 2014 compelled our conclusion that fuel management is not feasible and that add-on acid gas control must be employed. The prospect of controlling hydrogen chloride emissions would seem to help facilitate NOx control through ammonia injection, but that is not the case. All feasible add-on NOx control technologies result in residual ammonia "slip." No chloride control technology captures all of the chloride. Accordingly, the ammonia slip will combine with the residual chloride to form ammonium chloride fume that presents fine particulate matter emissions and may result in persistent opacity. To minimize this issue, either ammonia or chloride emissions must be exceedingly low. This circumstance adds notable complexity, cost, and operational issues, and would still present significant fine particulate emissions. STK contends that tandem control of NOx and HCl in this specific case remains not reasonably feasible.

STK has investigated other potentially available NOx control options. I noted above our efforts to reduce NOx emissions through combustion factors (design and management). Our previous applications addressed other NOx control technologies. In each case it is evident that compliance cannot be achieved without a significant "step change" in technology. To the extent the BACT selection process specifies a NOx performance level associated with a particular technology and the Ogden Memo appears to be meant to address factual errors that inadvertently make their way in to PSD permits, STK does not believe that the Ogden Memo compels a technology step change and the resultant high cost of control when the BACT performance assumption was factually incorrect. This interpretation notwithstanding, STK has investigated all available options to reduce emissions, demonstrated that compliance cannot be achieved, and therefore meets the third criterion of the Ogden Memo.

In summary, STK believes that the three criteria identified in the Ogden Memo have been met, and that a NOx BACT limit revision is consistent with PSD requirements. If you have any questions regarding the information provided or would like to discuss further, please contact me at (253) 596-0296. Thank you.

Sincerely,

Lester Keel, P.E.
Environmental Manager

CC Kate Kelly, USEPA
David Bray, USEPA (by email)
Garin Schrieve, Ecology (by email)
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